

表1 检测项目表			
测试项目		检测对象	送样要求
激光微区原位分析	U-Th-Pb测年及微量元素含量	锆石、独居石等富U矿物	挑纯单矿物, 制靶
	Hf同位素	锆石等富Hf单矿物	挑纯单矿物, 制靶
	B同位素	电气石	制靶或探针片
	Sr同位素	珊瑚、磷灰石	制靶或探针片
整体样品同位素定年分析	Rb-Sr (ID-TIMS法)	全岩、单矿物(磷灰石、长石、云母、角闪石、石英、闪锌矿、黄铁矿、黄铜矿等)	单矿物纯度98%以上; 全岩200目
	Sm-Nd (ID-TIMS法)	全岩、单矿物(萤石、方解石、石榴子石、白钨矿、辉石等)、玄武岩和火成碳酸岩分相	单矿物纯度98%以上; 全岩200目
	Pb-Pb	全岩 (碳酸盐岩、黑色页岩等)、硫化物、锡石	单矿物纯度98%以上; 全岩200目
	Re-Os (ID-TIMS法)	辉钼矿、黄铁矿、黄铜矿等; 超基性岩、基性-中基性岩、黑色页岩等	单矿物纯度98%以上; 全岩200目
	氡	水	不少于1 L
整体样品同位素示踪分析	Sr同位素	全岩、水样、富Sr单矿物等	单矿物纯度98%以上; 全岩200目, 水不少于500ml
	Nd同位素	全岩、富Nd单矿物	单矿物纯度98%以上; 全岩200目
	Pb同位素	全岩、硫化物、锡石等富Pb单矿物、土壤、农产品 (植物)、大气降尘、煤、水样等	单矿物纯度98%以上; 全岩等200目, 植物样需干燥后碎至粉末, 样品量不少于30g; 水样不少于1L
	Os同位素	超基性岩、基性-中基性岩、黑色页岩、炭质泥岩等	全岩200目
	Cd 同位素	土壤、矿石、闪锌矿等	单矿物纯度98%以上; 全岩等200目; 土壤样Cd含量高于2µg/g
	Cu 同位素	岩石、矿石、沉积物、富Cu单矿物、土壤等	单矿物纯度98%以上; 其他200目, Cu含量高于20 µg/g
	Fe 同位素	岩石、矿石、沉积物、富Fe单矿物、土壤等	单矿物纯度98%以上; 其他200目, Fe含量高于500µg/g
	Zn 同位素	岩石、矿石、沉积物、富Zn单矿物、土壤等	单矿物纯度98%以上; 其他200目, Zn含量高于20 µg/g

TABLE 1 ANALYSIS SERVICE LIST			
Analysis Methods		Samples	Descriptions
In Situ Laser Microanalysis	U-Th-Pb dating and trace element quantitative analysis	Zircon, Monazite, and other U-rich minerals	Mineral separate mounted
	Hf isotope analysis	Zircon, Hf-rich minerals	Mineral separate mounted
	B isotope analysis	Tourmaline	Polished thin section or mount
	Sr isotope analysis	Coral, Apatite	Polished thin section or mount
Isotope Geochronology	Rb-Sr analysis (ID-TIMS)	Whole rock, mineral separate (apatite, feldspar, mica, amphibole, quartz, sphalerite, pyrite, chalcopyrite, etc.)	The targeted mineral should be more than 98% in the mineral separate, and the whole rock powdered to 200 mesh
	Sm-Nd analysis (ID-TIMS)	Whole rock, mineral separate (fluorite, calcite, garnet, scheelite, pyroxene), basalt and igneous carbonate rock with phase-separation method	The targeted mineral should be more than 98% in the mineral separate, and the whole rock powdered to 200 mesh
	Pb-Pb analysis	Whole rock (carbonate rock, black shale, etc.), sulfide, cassiterite	The targeted mineral should be more than 98% in the mineral separate, and the whole rock powdered to 200 mesh
	Re-Os analysis (ID-TIMS)	Molybdenite, pyrite, chalcopyrite, ultrabasic rocks, basic to intermediate rocks, black shale, etc	The targeted mineral should be more than 98% in the mineral separate, and the whole rock powdered to 200 mesh
	Tritium analysis	Water Samples	More than 1 L
Isotope Geochemistry	Sr isotopes	Whole rock, Water, Sr-rich mineral separates, etc.	The targeted mineral should be more than 98% in the mineral separate, and the whole rock powdered to 200 mesh; The water should be more than 1L.
	Nd isotopes	Whole rock, Nd-rich mineral separates	The targeted mineral should be more than 98% in the mineral separate, and the whole rock powdered to 200 mesh
	Pb isotopes	Whole rock, Pb rich minerals, sulfide, cassiterite, soil, agricultural products (plants), atmospheric dust, coal, water samples, etc.	The targeted mineral should be more than 98% in the mineral separate, and the whole rock powdered to 200 mesh; the plant sample should be dried and crushed to powder, and the sample weigh more than 30 g; The water should be more than 1L.
	Os isotopes	Ultrabasic rocks, basic intermediate rocks, black shale, carbonaceous mudstone, etc.	Powdered to 200 mesh
	Cd isotopes	Soil, ore, sphalerite, etc.	The targeted mineral should be more than 98% in the mineral separate, and the whole rock powdered to 200 mesh; the Cd content in soil samples should be more than 2 µg/g
	Cu isotopes	Rock, ore, sediment, Cu-rich mineral, soil, etc.	The targeted mineral should be more than 98% in the mineral separate, and the whole rock powdered to 200 mesh; the Cu content in the sample should be more than 20µg/g.
	Fe isotopes	Rock, ore, sediment, Fe-rich mineral, soil, etc.	The targeted mineral should be more than 98% in the mineral separate, and the whole rock powdered to 200 mesh, and the Fe content in the sample should be more than 500µg/g
	Zn isotopes	Rock, ore, sediment, Zn-rich mineral, soil, etc.	The targeted mineral should be more than 98% in the mineral separate, and the whole rock powdered to 200 mesh; the Zn content in the sample should be more than 20 µg/g

表1 检测项目表			
测试项目		检测对象	送样要求
气体稳定同位素分析	H、O同位素	水、岩石矿物包裹体水	水样密封保存, 满瓶不留空气, 及时送往实验室, 不少于5mL, 盐度小于4%;单矿物纯度98%以上, 60目。
	C、O同位素	碳酸盐岩(白云岩、灰岩)、泥岩等、碳酸盐矿物(方解石、白云石、菱铁矿、菱锰矿等)、化石、珊瑚、石笋、钙结核等	单矿物纯度98%以上;其他200目
	C同位素	水中溶解无机碳(DIC)、颗粒有机碳(POC)	加氯化汞密封保存, 满瓶不留空气, 及时送往实验室, 无机碳浓度不低于1mmol/L
	O同位素	磷酸盐矿物、岩石及水中磷酸根; 硫酸盐矿物、岩石及水中硫酸根	水中磷酸根加氯化镁、氢氧化钠形成沉淀(海水不用加氯化镁), 密封保存, 磷酸盐不少于5mg; 水中硫酸根不少于10mg/L, 加盐酸至PH值小于2
	C、N同位素	固体有机物(沉积岩、水系沉积物、土壤、植物)、干酪根等	200目, 去除无机碳、氮, 有机碳、氮含量不低于1mg/g
	C、H同位素	有机气体(页岩气、天然气、煤气等)单体	气体不少于20mL (1个大气压)
	S同位素	岩石、硫化物(包括自然硫、雄黄、雌黄等)、硫酸盐矿物、硫酸钡沉淀、水、固体有机物(煤、植物、土壤、淤泥)	200目;单矿物纯度98%以上;水中SO ₄ ²⁻ 富集沉淀后的硫酸钡不低于2mg
自然资源调查样品分析	主量元素、微量元素、稀土元素及其他元素、有效态、形态等	岩石、矿物、土壤、植物等	样品量100g以上, 含样品加工
	水质综合分析	地下水、地表水等	密封, 原水或加酸等保护剂, 分类取样。
	水质有机分析	地下水、地表水等	密封, 冷藏。
	土壤有机分析	土壤	密封, 冷藏。
岩石矿物和油气样品观察及鉴定	岩石矿物鉴定, 矿物分析	岩石矿物、材料等	薄片、光片、探针片
	激光拉曼分析, 包裹体测温	岩石矿物等	单矿物、沥青, 测温片
	激光粒度分析	土壤、水系沉积物等	原样, 不少于100g
	扫描电镜分析	岩石矿物、材料、化石等	制片
	原子力显微镜分析	油页岩、材料等	制片
	阴极发光分析	岩石矿物等	测温片
	核磁共振孔隙度、渗透率, 低温液氮比表面积分析	油页岩等	柱塞样、粉末
	总碳、总硫、总氮及有机碳分析	油页岩等	粉末
	爆裂法包裹体气相、液相成分分析	石英、萤石、石榴子石、硫化物、方解石等	单矿物纯度98%以上;石英、萤石、石榴子石60-80目, 硫化物40-60目, 方解石等20-40目

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Analysis Methods		Samples	Descriptions
Gas Stable Isotope Analysis	H-O isotopes	Water, inclusion water in rocks and minerals	The water should be sealed in bottle full with sample water without air and sent to the lab soon after being collected, with volume more than 5ml and salinity less than 4%. The targeted mineral should be more than 98% in the mineral separate, and the whole rock powdered to 60 mesh.
	C-O isotopes	Carbonate rocks (dolomite, limestone), mudstones, carbonate minerals (calcite, dolomite, siderite, rhodochrosite, etc.), fossils, corals, stalagmites, calcium nodules, etc.	The targeted mineral should be more than 98% in the mineral separate, and the whole rock powdered to 200 mesh
	C isotopes	Dissolved inorganic carbon (DIC) and particulate organic carbon (POC) in water	With HgF ₂ added into the sample, sealed in bottle full with sample water with no air and sent to laboratory soon after being collected, and the concentration of inorganic carbon should be more than 1 mmol/L
	O isotopes	Phosphate minerals, rocks and water	With NaOH added With HgF, added into the sample, sealed in bottle, and the content of phosphate in the sample should be more than 5 mg
	C-N isotopes	Solid organics (sedimentary rock, stream sediment, soil, plant), kerogen, etc.	Powdered to 200 mesh; the concentration of organic carbon and nitrogen should be more than 1mg/g
	C-H isotopes	Organic gas (shale gas, natural gas, gas, etc.)	Gas volume more than 20mL (1 ATM)
	S isotopes	Rocks, Sulfides, natural sulfur (including realgar, orpiment, etc.), sulfate mineral, barium sulfate precipitation, water, solid organics (coal, plant, soil, silt)	The targeted mineral should be more than 98% in the mineral separate and whole rock powdered to 200 mesh; the concentration of SO ₄ ²⁻ in water should be more than 10mg/L
Sample analyses for natural resource survey	Major elements, trace elements, rare earth elements and other elements, effective state, form, etc.	rocks, minerals, soil, plants, etc.	Sample should be more than 100g
	Comprehensive analysis of water quality	Groundwater, surface water, etc.	With acid or protective agent added and sealed
	Organic analysis of water quality	Groundwater, surface water, etc.	Sealed, cold storage
	Soil organic analysis	Soil	Sealed, cold storage
Observation And Identification Of Rocks, Minerals And Oil And Gas Samples	Identification of rocks and minerals, mineral EMPA analysis	Rocks, minerals, materials, etc.	Thin slice, polished section, polished thin section
	laser Raman analysis, Inclusion thermometry	Rocks and minerals, etc.	Mineral, bitumen and thin section
	Laser particle size analysis	Soil, aqueous sediments	Original samples, more than 100 g
	Field Emission Scanning Electron Microscopy analysis	Rocks, minerals, materials, etc.	Thin section
	Atomic Force Microscope analysis	Oil shale, materials, etc.	Thin section
	Cathode Luminescence analysis	Rocks and minerals, etc.	Thin section
	Porosity, permeability (NMR) ; specific surface area analysis and organic carbon analysis	Oil shale, etc.	Plug sample, powder
	Carbon, sulfur, Nitrogen and organic carbon analysis	Oil shale, etc.	Powder
	Composition analysis of gas and liquid phase of inclusions	Quartz, fluorite, garnet, sulfide, calcite, etc.	The targeted mineral should be more than 98% in the mineral separate; quartz, fluorite, garnet powdered to 60-80 mesh, sulfide powdered to 40-60 mesh, calcite powdered to 20-40 mesh